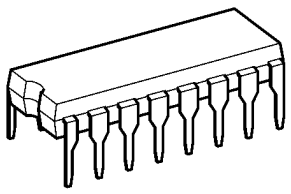
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC4511BP,TC4511BF

TC4511B BCD-to-Seven Segment Latch/Decoder/Driver

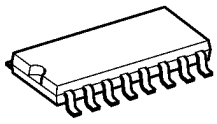
TC4511B is decoder which converts the input of BCD code into the 7 segment display element driving signal and the output has complementary connection of NPN bipolar transistor and N-channel MOS FET. Therefore, not only capability of directly driving cathode common type LED, this has capability of driving various display elements with simple interface circuits. $\overline{LT}$ input and $\overline{BI}$ input are to force all the outputs to be "H" (illuminated) and "L" (not illuminated) respectively regardless of BCD input. As the latch controlled by common LE input is inserted in each of four input lines, static display of dynamic information can be achieved. When an invalid BCD input, "10" or higher is applied, all the outputs become "L" (not illuminated).

TC4511BP



DIP16-P-300-2.54A

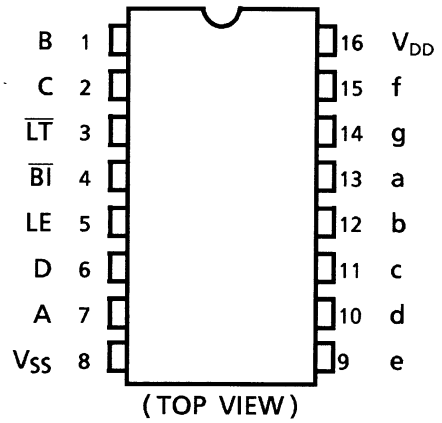
TC4511BF



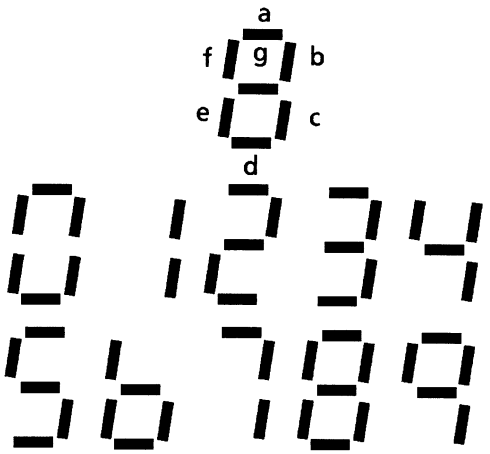
SOP16-P-300-1.27A

Weight
DIP16-P-300-2.54A : 1.00 g (typ.)
SOP16-P-300-1.27A : 0.18 g (typ.)

Pin Assignment



Display



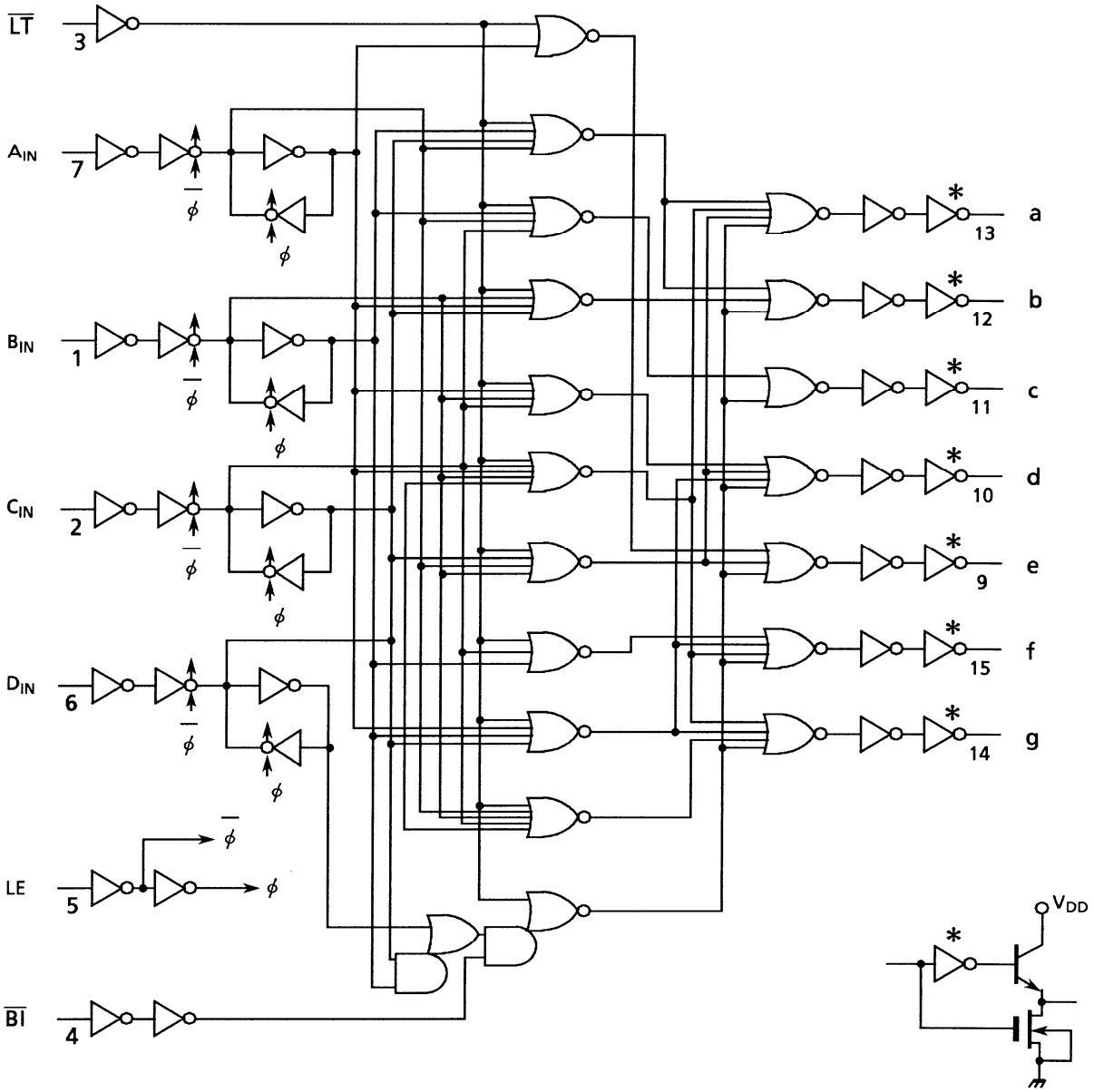
Truth Table

Inputs							Outputs							Display Mode
LE	$\overline{BI}$	$\overline{LT}$	D	C	B	A	a	b	c	d	e	f	g	
*	*	L	*	*	*	*	H	H	H	H	H	H	H	8
*	L	H	*	*	*	*	L	L	L	L	L	L	L	Blank
L	H	H	L	L	L	L	H	H	H	H	H	H	L	0
L	H	H	L	L	L	H	L	H	H	L	L	L	L	1
L	H	H	L	L	H	L	H	H	L	H	H	L	H	2
L	H	H	L	L	H	H	H	H	H	H	L	L	H	3
L	H	H	L	H	L	L	L	H	H	L	L	H	H	4
L	H	H	L	H	L	H	H	L	H	H	L	H	H	5
L	H	H	L	H	H	L	L	L	H	H	H	H	H	6
L	H	H	L	H	H	H	H	H	H	L	L	L	L	7
L	H	H	H	L	L	L	H	H	H	H	H	H	H	8
L	H	H	H	L	L	H	H	H	H	L	L	H	H	9
L	H	H	H	L	H	L	L	L	L	L	L	L	L	Blank
L	H	H	H	L	H	H	L	L	L	L	L	L	L	Blank
L	H	H	H	H	*	*	L	L	L	L	L	L	L	Blank
H	H	H	*	*	*	*	ΔΔ							

*: Don't care

ΔΔ: Depends upon the BCD code previously applied when LE "L"

Logic Diagram



Absolute Maximum Ratings (Note)

Characteristics	Symbol	Rating	Unit
DC supply voltage	V_{DD}	$V_{SS} - 0.5 \sim V_{SS} + 20$	V
Input voltage	V_{IN}	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Output voltage	V_{OUT}	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
DC input current	I_{IN}	± 10	mA
Output high current	I_{OH}	-50	mA
Power dissipation	P_D	300 (DIP)/180 (SOIC)	mW
Operating temperature range	T_{opr}	$-40 \sim 85$	°C
Storage temperature range	T_{stg}	$-65 \sim 150$	°C

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Operating Range (V_{SS} = 0 V) (Note)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
DC supply voltage	V_{DD}	—	3	—	18	V
Input voltage	V_{IN}	—	0	—	V_{DD}	V

Note: The operating ranges must be maintained to ensure the normal operation of the device.
Unused inputs must be tied to either V_{DD} or V_{SS}.

Static Electrical Characteristics (V_{SS} = 0 V)

Characteristics		Sym-bol	Test Condition		−40°C		25°C			85°C		Unit
				V_{DD} (V)	Min	Max	Min	Typ.	Max	Min	Max	
High-level output voltage		V_{OH}	$\|I_{OUT}\| < 1$ μA $V_{IN} = V_{SS}, V_{DD}$	5	4.1	—	4.1	4.41	—	4.2	—	V
				10	9.1	—	9.1	9.41	—	9.2	—	
				15	14.1	—	14.1	14.41	—	14.2	—	
Low-level output voltage		V_{OL}	$\|I_{OUT}\| < 1$ μA $V_{IN} = V_{SS}, V_{DD}$	5	—	0.05	—	0.00	0.05	—	0.05	V
				10	—	0.05	—	0.00	0.05	—	0.05	
				15	—	0.05	—	0.00	0.05	—	0.05	
Output high voltage		V_{OH}	I_{OH} = 0 mA	5	4.10	—	4.10	4.41	—	4.20	—	V
			I_{OH} = 10 mA		3.90	—	3.90	4.25	—	3.90	—	
			I_{OH} = 20 mA		3.55	—	3.55	4.19	—	3.30	—	
			$V_{IN} = V_{DD}, V_{SS}$									
			I_{OH} = 0 mA	10	9.10	—	9.10	9.41	—	9.20	—	
			I_{OH} = 10 mA		9.00	—	9.00	9.25	—	9.00	—	
			I_{OH} = 20 mA		8.70	—	8.70	9.20	—	8.40	—	
			$V_{IN} = V_{DD}, V_{SS}$									
			I_{OH} = 0 mA	15	14.10	—	14.10	14.41	—	14.20	—	
			I_{OH} = 10 mA		14.00	—	14.00	14.26	—	14.00	—	
			I_{OH} = 20 mA		13.75	—	13.75	14.21	—	13.50	—	
			$V_{IN} = V_{DD}, V_{SS}$									
Output low voltage		I_{OL}	V_{OUT} = 0.4 V	5	0.61	—	0.51	1.2	—	0.42	—	mA
			V_{OUT} = 0.5 V	10	1.5	—	1.3	3.2	—	1.1	—	
			V_{OUT} = 1.5 V	15	4.0	—	3.4	12.0	—	2.8	—	
			$V_{IN} = V_{DD}, V_{SS}$									
Input high voltage		V_{IH}	V_{OUT} = 0.5 V, 4.5 V	5	3.5	—	3.5	2.75	—	3.5	—	V
			V_{OUT} = 1.0 V, 9.0 V	10	7.0	—	7.0	5.50	—	7.0	—	
			V_{OUT} = 1.5 V, 13.5 V	15	11.0	—	11.0	8.25	—	11.0	—	
			$\|I_{OUT}\| < 1$ μA									
Input low voltage		V_{IL}	V_{OUT} = 0.5 V, 4.5 V	5	—	1.5	—	2.25	1.5	—	1.5	V
			V_{OUT} = 1.0 V, 9.0 V	10	—	3.0	—	4.5	3.0	—	3.0	
			V_{OUT} = 1.5 V, 13.5 V	15	—	4.0	—	6.75	4.0	—	4.0	
			$\|I_{OUT}\| < 1$ μA									
Input current	"H" level	I_{IH}	V_{IH} = 18 V	18	—	0.1	—	10^{-5}	0.1	—	1.0	μA
	"L" level	I_{IL}	V_{IL} = 0 V	18	—	−0.1	—	-10^{-5}	−0.1	—	−1.0	
Quiescent supply current		I_{DD}	$V_{IN} = V_{SS}, V_{DD}$ (Note)	5	—	5	—	0.005	5	—	150	μA
				10	—	10	—	0.010	10	—	300	
				15	—	20	—	0.015	20	—	600	

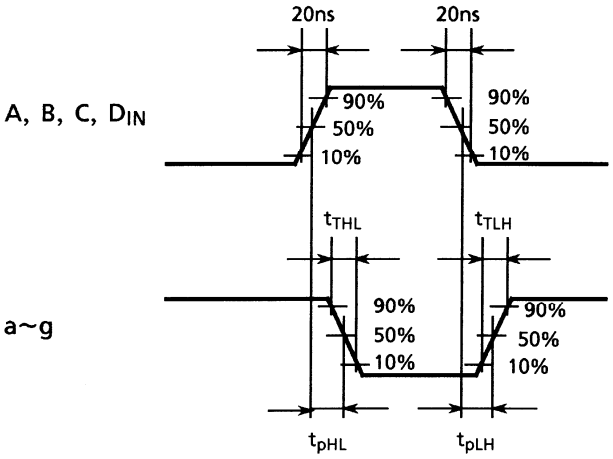
Note: All valid input combinations.

Dynamic Electrical Characteristics (Ta = 25°C, V_{SS} = 0 V, C_L = 50 pF, R_L = 10 kΩ)

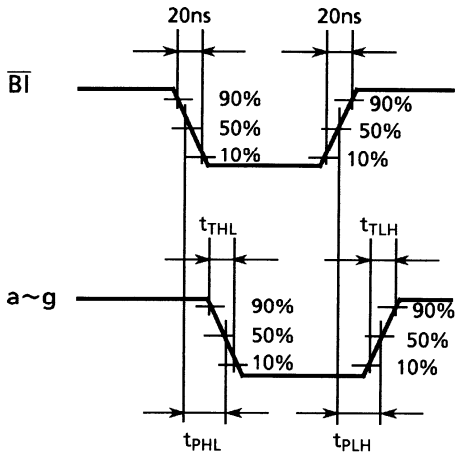
Characteristics	Symbol	Test Condition	V_{DD} (V)	Min	Typ.	Max	Unit
Output transition time (low to high)	t_{TLH}	—	5	—	25	80	ns
			10	—	15	60	
			15	—	15	50	
Output transition time (high to low)	t_{THL}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Propagation delay time (DATA-OUT)	t_{pLH}	—	5	—	200	1040	ns
			10	—	90	420	
			15	—	65	300	
Propagation delay time (DATA-OUT)	t_{pHL}	—	5	—	230	1040	ns
			10	—	110	420	
			15	—	80	300	
Propagation delay time ($\overline{BI}$ -OUT)	t_{pLH}	—	5	—	75	640	ns
			10	—	45	260	
			15	—	35	200	
Propagation delay time ($\overline{BI}$ -OUT)	t_{pHL}	—	5	—	90	640	ns
			10	—	50	260	
			15	—	45	200	
Propagation delay time ($\overline{LT}$ -OUT)	t_{pLH}	—	5	—	60	300	ns
			10	—	40	150	
			15	—	35	100	
Propagation delay time ($\overline{LT}$ -OUT)	t_{pHL}	—	5	—	75	300	ns
			10	—	45	150	
			15	—	35	100	
Propagation delay time (LE-OUT)	t_{pLH}	—	5	—	180	600	ns
			10	—	90	300	
			15	—	65	250	
Propagation delay time (LE-OUT)	t_{pHL}	—	5	—	230	600	ns
			10	—	110	300	
			15	—	85	250	
Min pulse time (LE)	t_{WL}	—	5	—	40	300	ns
			10	—	20	150	
			15	—	15	120	
Min set-up time (DATA-LE)	t_{SU}	—	5	—	35	150	ns
			10	—	15	70	
			15	—	10	40	
Min hold time (DATA-LE)	t_H	—	5	—	—	0	ns
			10	—	—	0	
			15	—	—	0	
Input capacitance	C_{IN}	—		—	5	7.5	pF

Waveform for Measurement of Dynamic Characteristics

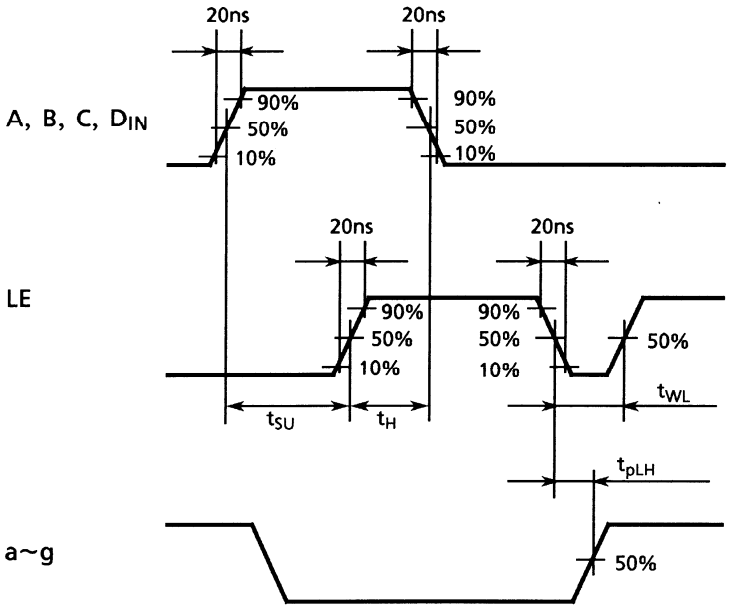
Waveform 1



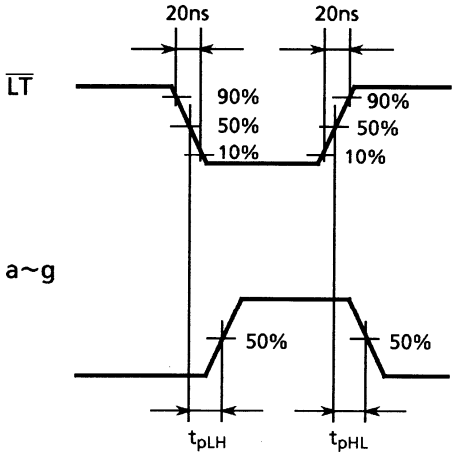
Waveform 2



Waveform 3

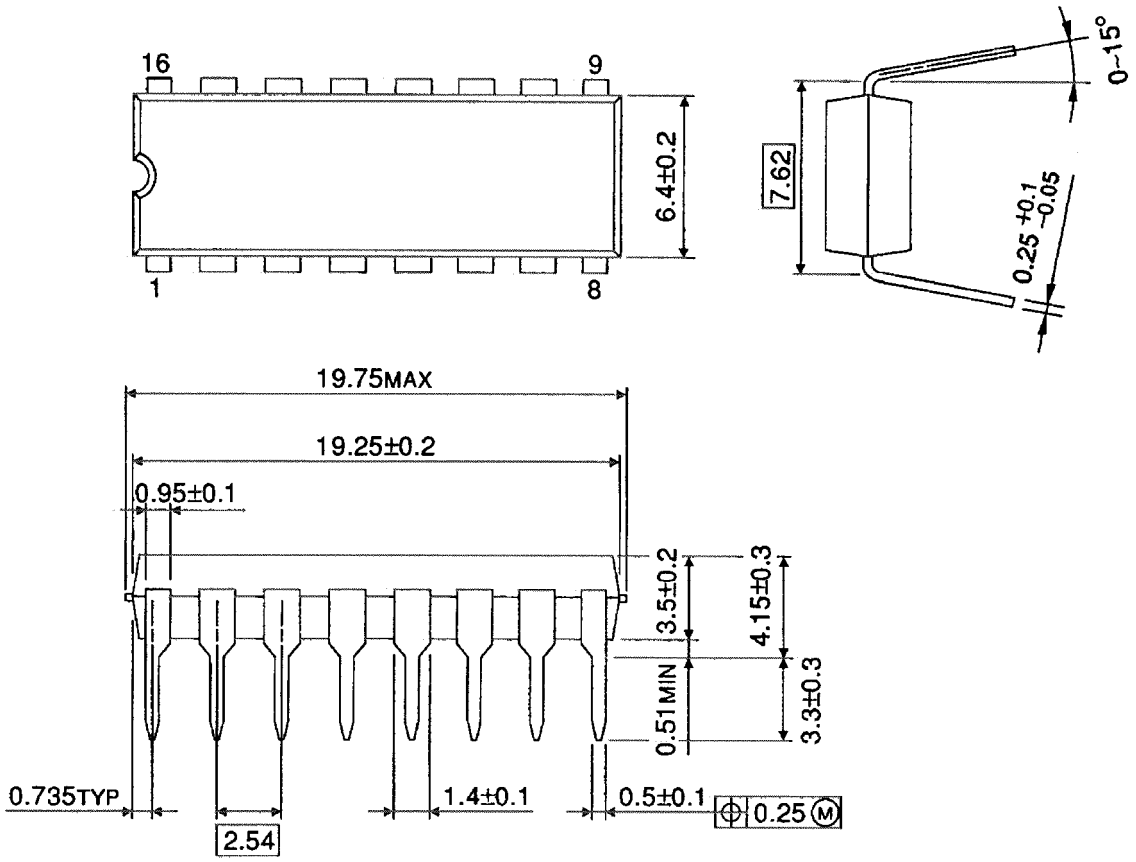


Waveform 4



Package Dimensions

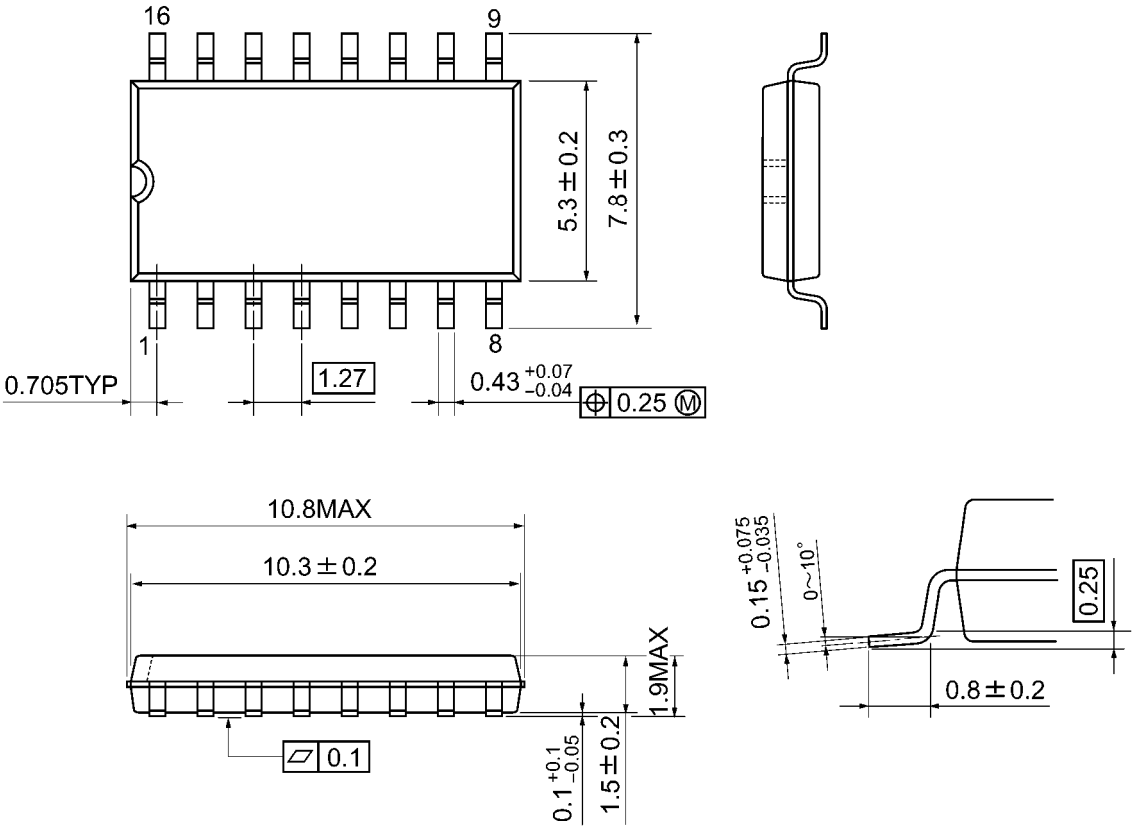
DIP16-P-300-2.54A Unit : mm



Weight: 1.00 g (typ.)

Package Dimensions

SOP16-P-300-1.27A Unit: mm



Weight: 0.18 g (typ.)

RESTRICTIONS ON PRODUCT USE

- Toshiba Corporation, and its subsidiaries and affiliates (collectively “TOSHIBA”), reserve the right to make changes to the information in this document, and related hardware, software and systems (collectively “Product”) without notice.
- This document and any information herein may not be reproduced without prior written permission from TOSHIBA. Even with TOSHIBA’s written permission, reproduction is permissible only if reproduction is without alteration/omission.
- Though TOSHIBA works continually to improve Product’s quality and reliability, Product can malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. Before creating and producing designs and using, customers must also refer to and comply with (a) the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the “TOSHIBA Semiconductor Reliability Handbook” and (b) the instructions for the application that Product will be used with or for. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this Product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. **TOSHIBA ASSUMES NO LIABILITY FOR CUSTOMERS’ PRODUCT DESIGN OR APPLICATIONS.**
- Product is intended for use in general electronics applications (e.g., computers, personal equipment, office equipment, measuring equipment, industrial robots and home electronics appliances) or for specific applications as expressly stated in this document. Product is neither intended nor warranted for use in equipment or systems that require extraordinarily high levels of quality and/or reliability and/or a malfunction or failure of which may cause loss of human life, bodily injury, serious property damage or serious public impact (“Unintended Use”). Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. Do not use Product for Unintended Use unless specifically permitted in this document.
- Do not disassemble, analyze, reverse-engineer, alter, modify, translate or copy Product, whether in whole or in part.
- Product shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.
- The information contained herein is presented only as guidance for Product use. No responsibility is assumed by TOSHIBA for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.
- **ABSENT A WRITTEN SIGNED AGREEMENT, EXCEPT AS PROVIDED IN THE RELEVANT TERMS AND CONDITIONS OF SALE FOR PRODUCT, AND TO THE MAXIMUM EXTENT ALLOWABLE BY LAW, TOSHIBA (1) ASSUMES NO LIABILITY WHATSOEVER, INCLUDING WITHOUT LIMITATION, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OR LOSS, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF OPPORTUNITIES, BUSINESS INTERRUPTION AND LOSS OF DATA, AND (2) DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES AND CONDITIONS RELATED TO SALE, USE OF PRODUCT, OR INFORMATION, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY OF INFORMATION, OR NONINFRINGEMENT.**
- Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
- Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. Please use Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. TOSHIBA assumes no liability for damages or losses occurring as a result of noncompliance with applicable laws and regulations.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Encoders, Decoders, Multiplexers & Demultiplexers ***category:***

Click to view products by Toshiba ***manufacturer:***

Other Similar products are found below :

M38510/01406BEA MC74HC163ADTG 74HC253N HMC854LC5TR NLV74VHC1G01DFT1G NLVHC4851ADTR2G NLVHCT4851ADTR2G PI3B33X257BE M74HCT4052ADTR2G M74VHC1GT04DFT3G TC74AC138P(F) MC74LVX4051MNTWG HMC855LC5TR NLV14028BDR2G NLV14051BDR2G NLV74HC238ADTR2G 715428X COMX-CAR-210 5962-8607001EA 5962-8756601EA MAX3783UCM+D PI5C3253QEX 8CA3052APGGI8 TC74HC4051AF(EL,F) TC74VHC138F(EL,K,F PI3B3251LE PI5C3309UEX PI5C3251QEX PI3B3251QE 74VHC4052AFT(BJ) PI3PCIE3415AZHEX NLV74HC4851AMNTWG MC74LVX257DG M74HC151YRM13TR M74HC151YTTR PI5USB31213XEAEX M74HCT4851ADWR2G XD74LS154 AP4373AW5-7-01 QS3VH251QG8 QS4A201QG HCS301T-ISN HCS500-I/SM MC74HC151ADTG TC4066BP(N,F) 74ACT11139PWR HMC728LC3CTR 74VHC238FT(BJ) 74VHC4066AFT(BJ) 74VHCT138AFT(BJ)